THE OHIO STATE UNIVERSITY
FISHER COLLEGE OF BUSINESS

Fisher College of Business
Working Paper Series

Charles A. Dice Center for Research in Financial Economics

Do firms issue more equity when markets become more liquid?

Rogier M. Hanselaar,
Erasmus University

René M. Stulz,
The Ohio State University and NBER

Mathijs A. van Dijk,
Erasmus University

Dice Center WP 2016-24
Fisher College of Business WP 2016-03-024

December 2016

This paper can be downloaded without charge from: http://www.ssrn.com/abstract=2891439

An index to the working paper in the Fisher College of Business Working Paper Series is located at:
http://www.ssrn.com/link/Fisher-College-of-Business.html

fisher.osu.edu

Electronic copy available at: https://ssrn.com/abstract=2891439

Do firms issue more equity when markets become more liquid?

Rogier M. Hanselaar, René M. Stulz, and Mathijs A. van Dijk*

December 2016

Abstract

Using quarterly data on IPOs and SEOs in 38 countries over the period 1995-2014, we show that changes in equity issuance are significantly and positively related to lagged changes in aggregate local market liquidity. This relation is at least as economically significant as the well-known relation between equity issuance and lagged stock returns. It survives the inclusion of proxies for market timing, capital market conditions, growth prospects, asymmetric information, and investor sentiment, as well as the exclusion of the financial crisis. Changes in liquidity are less relevant for firms that face greater financial pressures, firms in less financially developed countries, and during the financial crisis.

* Stulz is at The Ohio State University, NBER, and ECGI; Hanselaar and van Dijk are at Erasmus University. E-mail addresses: hanselaar@rsm.nl, stulz@cob.osu.edu, and madijk@rsm.nl. Van Dijk thanks the Netherlands Organization for Scientific Research (NWO) for financial support through a "Vidi" grant. We thank Dimitris Vagias for his research assistance on an earlier version of this paper. We are grateful for comments from Brian Baugh, Andrew Carverhill, Thierry Foucault, Edith Ginglinger, Yeejin Jang, Jeffrey Pontiff, Andreas Park, Ioanid Rosu, Charles Trzcinka, Avi Wohl, and seminar participants at Boston College, Boston University, Erasmus University, HEC Paris, Tel Aviv University, and the 2012 Frontiers of Finance Conference at Warwick Business School.

Electronic copy available at: https://ssrn.com/abstract=2891439

1. Introduction

There is a large literature showing that aggregate stock market liquidity changes over time within countries (e.g., Chordia, Sarkar, and Subrahmanyam, 2005; Lesmond, 2005). Greater stock market liquidity means that it is easier to sell shares without affecting their price. We therefore expect that increases in stock market liquidity should be associated with increases in equity issuance. In this paper, we investigate this hypothesis using a sample of 38 countries from 1995 to 2014. We find strong support for the hypothesis that equity issuance increases following improvements in stock market liquidity.

As a firm's shares trade in a less liquid market, investors have to be given more of a discount to absorb these shares. We would therefore expect that equity issuance is more costly for existing shareholders when a firm's stock is less liquid because an increase in the supply of shares has a greater price impact. As issuance becomes more costly, firms are expected to issue less equity, everything else equal. The liquidity of a firm's common stock can worsen because aggregate liquidity worsens or because of idiosyncratic shocks. Idiosyncratic liquidity shocks could be caused by shocks to firm attributes, so that it is difficult to identify the impact of liquidity as opposed to the impact of shocks to factors that affect liquidity as well as other firm characteristics. For instance, adverse information about a firm could increase information asymmetry which would lower liquidity. Since one would expect an increase in information asymmetry to make it more expensive for a firm to issue equity, identification of the liquidity effect on equity issuance when liquidity changes because of information asymmetry would be challenging. An additional complicating factor is that individual firms typically issue equity rarely, so that tests at the firm level are unlikely to have much power.

In this paper, we resolve the identification issue in assessing the role of liquidity in the issuance decision by focusing on equity issuance at the country level and by examining the relation between changes in aggregate equity issuance and changes in aggregate liquidity. Aggregate liquidity could affect a firm's decision to issue equity because there are strong common factors in liquidity (e.g.,

Electronic copy available at: https://ssrn.com/abstract=2891439

Chordia, Roll, and Subrahmanyam, 2000) and because aggregate liquidity could proxy for the general capacity of the market to absorb new shares. An additional advantage of studying the relation between changes in equity issuance and changes in liquidity at the country level instead of the firm level is that reverse causation is far less of a concern since new issues tend to represent a small fraction of the overall market.

Like earlier papers that investigate equity issuance globally, such as Henderson, Jegadeesh, and Weisbach (2006) and Kim and Weisbach (2008), we obtain data on equity issues from SDC and include both initial public offerings (IPOs) and seasoned equity offerings (SEOs). Our dataset has 3,020 country-quarters. The measure of equity issuance we focus on is the number of equity issues (IPOs and/or IPOs) by country in a given quarter. We use the Amihud (2002) price impact proxy (estimated quarterly for each country based on stock-level data) as our key liquidity measure. Since neither the number of issues nor aggregate liquidity is a stationary variable, we take first differences and run regressions of changes in equity issuance on changes in liquidity. Further, as noted by recent studies (e.g., Doidge, Karolyi, and Stulz, 2013; Kim and Weisbach, 2008; McLean, Zhang, and Zhao, 2011), countries differ along many dimensions that affect equity issuance. We therefore estimate our regressions with country fixed effects as well as quarter fixed effects. All of our regressions use quarterly data.

When we regress changes in equity issuance on lead, contemporaneous, and lagged changes in liquidity, we find that while the coefficients on lead liquidity changes and contemporaneous liquidity changes are not significant, the first three lagged liquidity changes have a positive and significant coefficient. Based on these three coefficients, a one standard deviation shock to liquidity is associated with an economically substantial 0.14 standard deviation cumulative shock to equity issuance over the subsequent three quarters. Since a large literature shows that liquidity and market returns are related (e.g., Amihud and Mendelson, 1986; Amihud, Hameed, Kang, and Zhang, 2015), our tests include these variables side-by-side. Doing so is especially important because market returns are used to explain variation in equity issuance by many studies (e.g., Henderson, Jegadeesh, and Weisbach, 2006) and are often interpreted as a proxy for market timing. We find positive and significant coefficients for contemporaneous and one- and two-quarter lagged market returns. These coefficients indicate that a one standard deviation shock to returns is associated with a 0.12 standard deviation cumulative shock to issuance over the next three quarters. Not only is the relation between liquidity changes and changes in equity issuance economically and statistically significant when we allow for a relation between changes in equity issuance and stock returns, but the economic significance of the liquidity coefficients is at least as large as the economic significance of the coefficients on market returns.

After having established that changes in equity issuance are positively related to liquidity changes, we examine whether this relation can be explained by variables known to be correlated with aggregate liquidity that could affect equity issuance on their own. For example, U.S. studies predicting aggregate seasoned equity issuance (e.g., Choe, Masulis, and Nanda, 1993) and the aggregate rate at which firms go public (e.g., Lowry, 2003) show that equity issuance is affected by the state of capital markets and aggregate economic activity, which are variables known to be related to liquidity as well.

Our first battery of tests therefore controls for proxies for general capital market conditions, such as market volatility, turnover, and liquidity risk. It is already known from the literature that aggregate equity issuance is lower when market volatility is higher (e.g., Schill, 2004). While we find a negative coefficient on lagged market volatility in our regressions, the coefficient is insignificant and its inclusion does not affect the coefficients on the liquidity variables. Similarly, market turnover is negatively related to equity issuance, but the inclusion of market turnover in the regression has no impact on the coefficients on liquidity. We find no evidence that equity issuance is related to liquidity risk.

Since at least Amihud and Mendelson (1986), it is known that liquidity is related to valuation. But as long as the correlation is not perfect, firms not only benefit from timing equity issues when market valuations are high, but also have separate incentives to time issues when the price impact of the increase in share supply is low. Our benchmark regressions already control for lead, contemporaneous, and lagged returns as proxies for market timing. Next, we additionally include a number of direct proxies for the level of market valuation. Market-to-book is used in studies of market timing (e.g., Loughran and Ritter, 1995, 1997; Baker and Wurgler, 2002; DeAngelo, DeAngelo, and Stulz, 2010). There is evidence that more liquid firms in the U.S. have a higher market-to-book ratio (Fang, Noe, and Tice, 2009), so that liquidity could proxy for market-to-book in our regressions. After controlling for liquidity and market returns, we find that the coefficients on lead, contemporaneous, and lagged changes in the market-to-book and the price-earnings ratios are positive as expected, but they are not consistently significant and their addition does not change the relation between equity issuance and liquidity. The addition of other variables that capture market conditions also does not change our inferences about the impact of market liquidity.

Recent research shows that liquidity is a predictor of economic activity (e.g., Næs, Skjeltorp, and Ødegaard, 2011). Since at least Miller (1963), poor economic activity has been associated with lower equity issuance and, not surprisingly, this finding holds in our sample. We find that when we control for proxies for future levels of economic activity, the coefficients on the liquidity measures remain economically and statistically significant.

We then turn to tests that focus more directly on the nature of the mechanism that explains the relation between liquidity and equity issuance. For firms, an equity issuance has costs and benefits. Firms that are in a better financial situation can more easily postpone an equity issue compared to firms that might be unable to pay their bills without new funding. When we separate firms into those that are making profits versus those that are making losses, we expect that firms making losses are more constrained in their issuance and hence are less affected by liquidity changes. We find that this is the case. Equity issuance by firms that are making losses is unaffected by changes in liquidity.

We also explore whether the relation between changes in equity issuance and changes in liquidity differs across countries and across time. Countries differ in the ease with which firms can issue equity. We expect firms in more financially developed countries to be better able to react to changes in liquidity. We find that this is the case. An obvious concern is that our results could be driven by the financial crisis. When we remove the 2008-2011 period from our sample, a period that includes the peak of the European sovereign crisis as well as what is often referred to as the credit crisis, our results are much stronger. In fact, the relation between equity issuance and liquidity largely disappears during the crisis period. It makes sense that once liquidity is really poor, changes in liquidity may not have much of an impact. Further, it also makes sense that firms that issue equity in the middle of a crisis do so because they have no choice and hence may not postpone their issue because of adverse recent changes in liquidity.

Our paper contributes to several literatures. Our primary contribution is to the equity issuance literature. We find that liquidity is an important determinant of equity issuance across the world. Though much of the recent literature on equity issuance has focused on market timing motivations for equity issuance, we show that liquidity's economic significance as a determinant of equity issuance is at least of the same magnitude as the economic significance of variables that proxy for market timing. A growing recent literature emphasizes the interaction between market liquidity and funding liquidity, following the work of Brunnermeier and Pedersen (2009). The empirical literature on this interaction has focused on financial institutions. The results in this paper suggest that market liquidity affects funding liquidity more generally.

There is a large literature that builds on the finding in Shleifer (1986) that a firm's stock price increases when it experiences an increase in demand because of being added to a stock index such as the S&P 500. Studies with access to data about demand curves for stocks find that demand curves are downward-sloping (e.g., Bagwell, 1992; Kandel, Sarig, and Wohl, 1999). If demand curves for stocks were perfectly elastic, we would not expect to find a relation between equity issuance changes and changes in liquidity. We contribute to this literature by presenting evidence indicating that downward-sloping demand curves may affect equity issuance.

Several papers investigate how stock liquidity affects some aspects of the equity issuance process. In particular, Butler, Grullon, and Weston (2005) show that underwriters charge more when liquidity is lower and Gao and Ritter (2010) demonstrate that underwriters affect the slope of the demand function for shares through their marketing activities. Our paper adds to that literature by showing that aggregate liquidity has a powerful relation with security issuance.

Finally, there is a large literature on the role of liquidity in the pricing of financial assets. In this paper, we provide evidence consistent with the view that the role of liquidity extends beyond the boundaries of financial markets and that it has a pervasive impact on corporate financial policies. While Fang, Noe, and Tice (2009) and Lipson and Mortal (2009) show that stock liquidity is related to a firm's capital structure, such a finding does not necessarily mean that firms are more likely to issue equity in more liquid markets. Our contribution therefore helps understand one mechanism whereby more liquid firms have less leverage, namely that higher liquidity makes it less costly to issue equity.

The paper proceeds as follows. In Section 2, we introduce our sample. In Section 3, we show that equity issuance is related to liquidity. In Section 4, we check whether equity issuance is related to liquidity because liquidity proxies for other variables that are known to affect equity issuance. In Section 5, we investigate in more detail the mechanism linking equity issuance to liquidity. We conclude in Section 6.

2. Data and methods

2.1 Issuance data

We obtain equity issuance data from the Securities Data Company (SDC). We select all issues that take place between 1990 and 2014 for 38 developed and developing countries. From this set of issues, we only include the main tranche of each issue when there are multiple tranches, to avoid double counting and problems with issues distributed across multiple exchanges or countries. We exclude offerings in which only secondary shares are offered. We also exclude all issues from utilities and financial firms, as equity issuance by such firms may be affected by regulations.

From this set of issues, we remove foreign issues by comparing the country of domicile of the company to the location of the exchange on which the shares are issued. If information on the location of the exchange is missing in the data from SDC, it is supplemented with information on exchange location from Datastream. We discard tiny issues, defined as issues in which the number of shares issued is less than one percent of the number of shares outstanding after the offering. Finally, for issues in the U.S. we distinguish between those that take place on the New York Stock Exchange, Nasdaq, or other exchanges. We keep the first two categories and treat them as separate "countries."[1] We discard the equity issues on the other U.S. exchanges.

We aggregate the number of issues by country (and in the case of the U.S. per exchange) and by quarter based on the issue date, and use it as the main variable in our regressions. Per country, we set all quarters without issues before the first quarter with a positive number of issues to missing; we set all quarters without issues after the first quarter with a positive number of issues to zero, as we assume that SDC coverage has started as of that date.

2.2. Market data

We obtain daily data on prices, returns, volume, and shares outstanding for individual common stocks for the U.S. from CRSP, and for the other countries in our sample from Datastream, over the period from the beginning of 1995 until the end of 2014. We aim to be conservative in what stocks we consider common stocks. For the data from CRSP, this is done by only including shares with share code 10 or 11. For the data from Datastream, we use the list of common stocks compiled by Hou and van Dijk (2016).

For non-U.S. stocks, we identify the main exchange of each country based on the number of

[1] Trading volume definitions differ across NYSE and Nasdaq (Gao and Ritter, 2010); as trading volume is an input into our liquidity calculations, keeping these exchanges together would cause liquidity levels to change mechanically depending on the mix of stocks from both exchanges.

stocks trading on each exchange. Except for China, Japan, and the U.S., we restrict the sample by only including stocks that are traded on the main exchange to avoid problems with conflicting trading mechanisms and conventions, similar to Karolyi, Lee, and van Dijk (2012). We split up U.S. stocks into those that trade on the NYSE and those that trade on Nasdaq. For Japan, we include stocks traded on the exchanges of Osaka and Tokyo because the trading volume definitions are the same for both exchanges; for China, we include stocks traded on the Shanghai and Shenzen exchanges for the same reason. For Brazil and Germany, we only use data from 2000 onwards. For Brazil, there is a change in trading definitions in 1999. Daily trading volume data is not readily available for Germany before 2000 (Karolyi, Lee, and van Dijk (2012)).

2.2.1. Liquidity

We use the price impact measure developed by Amihud (2002) as our (il)liquidity measure. The Amihud measure is designed to capture the marginal impact of a unit of trading volume on the stock price. It is computed as the daily ratio of the absolute stock return over the local currency trading volume of the stock. This measure stays close to the intuitive description of liquid markets as those that accommodate trading with the least effect on price (e.g., Kyle, 1985).

Amihud (2002) shows that this measure is strongly positively related to microstructure estimates of illiquidity for the U.S. stock market. Lesmond (2005) reports a high correlation between the Amihud measure and bid-ask spreads in 23 emerging markets. Hasbrouck (2009) and Goyenko, Holden, and Trzcinka (2009) show that the Amihud measure performs well relative to other proxies in capturing high-frequency measures of liquidity based on U.S. data. Fong, Holden, and Trzcinka (2016) show that the Amihud measure is among the best monthly price impact proxies to capture high-frequency price impact measures based on global data. In contrast to high-frequency measures of liquidity, we can readily compute the Amihud measure using daily data for a large number of countries. Many recent empirical studies use the Amihud measure to assess stock market liquidity, both for the U.S. and for other countries (e.g., Acharya and Pedersen, 2005; Spiegel and

Wang, 2005; Avramov, Chordia and Goyal, 2006; Kamara, Lou, and Sadka, 2008; Watanabe and Watanabe, 2008; and Beber and Pagano, 2013; Amihud, Hameed, Kang, and Zhang, 2015).

In constructing the Amihud measure, we stay close to the procedure described in Karolyi, Lee, and van Dijk (2012). We set all non-trading days, non-trading months, and outliers to missing. We consider a day to be a non-trading day if more than 90% of the stocks on a given exchange have a daily return equal to zero; we consider a month for a particular stock to be a non-trading month if zero-return days make up more than 80% of the total number of days in the month. We define a daily return for a particular stock as an outlier if it is in the top or bottom 0.1% of the cross-sectional distribution of daily returns on that day within the same country.

We calculate the Amihud measure per stock per day as:

$$Liq_{i,d} = -10{,}000 \times \log(1 + \frac{|R_{i,d}|}{P_{i,d} \times VO_{i,d}}), \tag{1}$$

where $R_{i,d}$ is the return of stock *i* on day d, $P_{i,d}$ is the price, and $VO_{i,d}$ is the trading volume in number of shares. We take logs of the standard Amihud proxy (absolute stock return divided by local currency trading volume) to ameliorate the impact of outliers, and we multiply the resulting measure by -10,000 to make it increasing in liquidity and to avoid very small values. The Amihud measure takes on values of negative infinity on days when there is no trading volume on a particular day for a particular stock; we set these values to missing. We average the liquidity over all days per month to obtain a monthly measure of liquidity for stock *i*.

2.2.2. Returns

We calculate monthly returns per stock from Datastream's return index (RI) and CRSP's holding period returns (RET). We use the filter suggested by Ince and Porter (2006) and discard a monthly stock return if $(1 + R_{i,m})(1 + R_{i,m-1}) \leq 0.5$, where $R_{i,m}$ is the return of stock *i* in month *m* and where $R_{i,m}$ and/or $R_{i,m-1}$ is larger than 300%.

2.2.3. Turnover

To measure turnover, we follow Karolyi, Lee, and van Dijk (2012). We calculate our turnover series as:

$$Turn_{i,d} = \log\left(1 + \frac{UVO_{i,d}}{NOSH_{i,d}}\right) - \frac{1}{100}\sum_{k=1}^{100} \log\left(1 + \frac{UVO_{i,d-k}}{NOSH_{i,d-k}}\right), \qquad (2)$$

where $UVO_{i,d}$ is the unadjusted trading volume of stock *i* on day d, and $NOSH_{i,d}$ is the unadjusted number of shares outstanding. The second term on the right hand side of the equation is a moving average of past turnover; our turnover series is a deviation in turnover from this moving average. A similar approach is taken in other studies (e.g., Griffin, Nardari, and Stulz, 2007; Lo and Wang, 2000).

2.2.4 Additional filters and aggregation

We set all monthly stock liquidity, returns, and turnover values to missing if the stock has a monthly price at the end of the previous month in the top or bottom 1% of the cross-sectional distribution within a country, or if the stock has a monthly return, monthly liquidity, or monthly turnover in the current month in the top or bottom 1% of the cross-sectional distribution within a country.

To obtain country level series, we average the monthly stock liquidity series, the monthly stock returns series, and the monthly stock turnover series across all stocks within a country, weighting the stock level series with their monthly market capitalization. Subsequently, we average the monthly country level variables to quarterly level variables. Finally, we winsorize the quarterly time-series of liquidity and turnover at the 1st and 99th percentile by country.

The country level liquidity proxy improves mechanically with increases in stock market capitalization. To remedy this, we follow Acharya and Pedersen (2005) and scale the liquidity series by country with the ratio of the market capitalization lagged by one quarter and the first available market capitalization for that country in the sample period.

2.3 Other variables

We obtain estimates of quarterly return volatility by country as the standard deviation of daily market returns within a quarter. We construct a quarterly time-series of liquidity risk by country as the conditional volatility of country level liquidity based on a GARCH(1,1) model estimated by country over the whole sample period. To obtain country level proxies for idiosyncratic volatility and stock price synchronicity, we follow Morck, Yeung, and Yu (2000) and first estimate a regression of daily individual stock returns on daily market returns per quarter for each individual stock. We require at least 15 non-missing observations per regression. From these regressions, we calculate the R^2 per stock per quarter, and the idiosyncratic volatility per stock per quarter. We take the average of these series, weighted by market capitalization, to obtain the average country level R^2 as well as country level idiosyncratic volatility. We logarithmically transform the average country level R^2 to obtain our measure of stock price synchronicity to prevent that its values always fall within the interval [0,1]. We obtain data on the country level price-to-book value (PTBV), price-earnings ratio (PE), and dividend yield (DY) from Datastream. As proxies for macroeconomic conditions, we download data on GDP growth, sales growth, a leading economic indicator, and closed-end funds from the IMF, OECD, and Bloomberg. A detailed description of all variable definitions and data sources is included in the Appendix.

2.4. Unit roots, first differencing

Due to differences in trading volume definitions and currency values, the means and standard deviations of the country level liquidity variable are not comparable across countries. To enhance comparability, we demean and standardize each of the country level variables by country. A beneficial side effect of this transformation is that this facilitates the interpretation of the regression coefficients later on.

For each country, the number of issues and the liquidity variables are tested for stationarity using Augmented Dickey-Fuller (ADF) tests. For several countries, non-stationarity cannot be rejected for one or both variables. This may be due to the low power of the ADF tests to reject the null of non-stationarity or due to the variables being truly non-stationary in nature. To avoid any potential issues related to non-stationarity, we take the first difference of both the number of issues and of country level liquidity. After taking first differences, non-stationarity of both variables is rejected for all countries in the sample.

2.5. Summary statistics.

Table 1 provides summary statistics for our sample. We have 22 exchanges from developed countries, representing 21 countries. We have 17 emerging countries. In total, we have 38 countries and 39 markets. The number of issues per country varies greatly. Australia has the largest number of issues and Portugal has the smallest number. In total, we have 81,021 issues. Roughly, three quarters of the issues are in developed countries. Of these equity issues, 58,778 are SEOs and 22,243 are IPOs. The U.S. has the most IPOs. We show the stock returns and the standard deviation of stock returns. All countries have positive average returns over our sample period. The lowest standard deviation of returns is for New Zealand and the highest is for Greece. On average, emerging markets have a higher average return and a higher standard deviation over our sample period.

The level of the Amihud liquidity measure is not comparable across countries because of differences in trading volume definitions and currency units. However, the standard deviation of the measure standardized by the absolute value of the mean gives a sense of the volatility of Amihud liquidity that is comparable across countries. Canada has the lowest (standardized) volatility of Amihud liquidity among developed countries. Amihud liquidity is considerably more volatile in emerging countries. Amihud liquidity volatility normalized by the absolute value of the mean averages 0.650 in developed countries and 1.039 in emerging countries.

3. Does liquidity help explain time-variation in equity issuance?

Table 2 shows the results of panel regressions of changes in equity issuance on changes in liquidity, market returns, and lagged issuance changes. The change in equity issuance is the quarterly change in the equity issuance count variable, i.e., the number of IPOs and SEOs. All models include country fixed effects to account for time-invariant country characteristics that can explain cross-country variation in equity issuance intensity (we note that Nasdaq and NYSE are treated as separate "countries" in this respect). To be conservative, we also include quarter fixed effects to account for any common global trends – although they subsume some of the time-variation in equity issuance that could potentially be due to liquidity changes. An additional benefit of quarter fixed effects is that they account for potential seasonality, as prior studies (e.g., Lowry, 2003) argue that there may be institutional reasons that cause equity issuance to be less intense in the first calendar quarter. Standard errors are clustered by country and by quarter. All country variables in the regressions are scaled to have mean zero and unit standard deviation.

Model (1) of Table 2 includes the one-quarter lead change in market liquidity, the contemporaneous change, four quarterly lagged changes, as well as the same leads and lags for market returns. We include market returns as it is well-accepted that equity issuance is related to market performance. The coefficients on the contemporaneous, the first and the third lag of liquidity changes are all positive and statistically significant. With the scaling we use, the one-quarter lagged liquidity coefficient of 0.06 indicates that a one standard deviation increase in liquidity in quarter t-1 is associated with an increase in equity issuance in quarter t corresponding to 6% of the standard deviation of equity issuance changes. A contemporaneous change in liquidity has the same impact as a lagged change. The sum of all six liquidity coefficients is 0.22, so that a permanent increase in liquidity of one standard deviation increases equity issuance by slightly more than one fifth of its standard deviation. The lead change in liquidity is not significant, so that firms do not appear to be able to time liquidity changes.

The coefficients on market returns are generally insignificant except for the contemporaneous coefficient which is 0.08. The sum of all six return coefficients in Model (1) is 0.11. Again, the lead coefficient is not significant, so that firms do not appear to be able to time aggregate market movements.[2] Further, the economic significance of liquidity changes is greater than the economic significance of market returns in this specification.

In Model (1) of Table 2, we do not include lags of the dependent variable. In Model (2), we add the first lag of the dependent variable. We see that it is highly significant with a negative coefficient. The coefficient is -0.45, so that a one standard deviation increase in equity issuance implies a decrease of almost half that increase the next quarter, indicating strong mean reversion in equity issuance. Adding this lagged variable increases the coefficients on the liquidity changes. Now, the contemporaneous liquidity change as well as the first three lags are significant. In Model (3), we use three lags of the dependent variable and find that all of them are significant. With three lags of the dependent variable, the contemporaneous change in market liquidity is not significant, but the first three lags are significant.

We note that when we take into account the lagged dependent variables, our estimate of the economic significance of the liquidity effects changes, because shocks to liquidity not only affect future equity issuance directly, but also indirectly through the lagged dependent variable. Taking these effects into account, the three significant liquidity coefficients at lags one through three in Model (3) indicate that a one standard deviation shock to liquidity is associated with an economically substantial 0.14 standard deviation cumulative shock to equity issuance over the subsequent three quarters.[3] Similarly, the three significant return coefficients in Model (3) indicate

---

[2] McLean, Pontiff, and Watanabe (2009) argue that firms issue shares for two reasons – optimal capital structure and market timing – and that issuance for market timing motives is more likely when issuance costs are low. This argument would suggest that issuance is more likely to predict negative stock returns in more liquid markets. In unreported analyses, we test this hypothesis by including interaction terms between lead market returns and contemporaneous and lagged market liquidity innovations and find that none of them has a significant coefficient.

[3] The economic significance of the three significant liquidity coefficients at lags one through three is computed as follows. In Model (3) of Table 2, the number of issues (y) is a function of liquidity (x) and lags of itself (the effect of market returns can be ignored for this computation): $y_t = \beta_1 x_{t-1} + \beta_2 x_{t-2} +$

that a one standard deviation shock to returns is associated with a 0.12 standard deviation cumulative shock to issuance over the next three quarters.[4]

Though we do not show the results, the fourth lag of changes in equity issuance is not significant and adding a fourth lag has no impact on the liquidity coefficients. In Model (4), we add one additional lead change in market liquidity and two additional lagged changes. Doing so has no material impact on our inferences and the added variables do not have significant coefficients. When we remove the lead changes for market liquidity and market returns in Model (5), our inferences are also not affected. Finally, instead of using lags of market liquidity changes and market returns, we estimate Model (6) using the cumulative change in liquidity and the cumulative market return from quarter *t*-4 to *t*-1. We find that the coefficients on the cumulative change in market liquidity and on the cumulative market return are almost the same (0.24 versus 0.25) and that both coefficients are significant at the 1% level.

In all the regressions shown so far, we include both changes in market liquidity and stock returns. An obvious concern is that these variables are correlated, in that it is known from the literature that improvements in liquidity are associated with positive stock returns (e.g., Amihud and Mendelson, 1986, Chordia, Huh, and Subrahmanyam, 2009; Bali, Peng, Shen, and Tang, 2014). Model (7) shows estimates when we omit stock returns. We see that the coefficients on liquidity are slightly larger at two of the included lags. When we omit changes in liquidity in Model (8), we find that the coefficients on returns are unchanged except that at lag one and lag four the coefficient is larger by 0.01. It follows that our inferences about the economic importance of liquidity changes

---

$\beta_3 x_{t-3} + \gamma_1 y_{t-1} + \gamma_2 y_{t-2} + \gamma_3 y_{t-3}$. If x_t is shocked by one standard deviation, keeping everything else equal (and noting that all variables are standardized to have unit standard deviation), then the effect on the change in the number of issues in subsequent quarters can be expressed as follows: $y_{t+1} = \beta_1$; $y_{t+2} = \beta_2 + \gamma_1\beta_1$; $y_{t+3} = \beta_3 + \gamma_1(\beta_2 + \gamma_1\beta_1) + \gamma_2\beta_1$. Substituting the coefficient estimates from Model (3) of Table 2 yields: $\widehat{y_{t+1}} = 0.07$; $\widehat{y_{t+2}} = 0.07 + 0.07 \times -0.6 = 0.028$; $\widehat{y_{t+3}} = 0.08 - 0.6 \times (0.07 - 0.6 \times 0.07) - 0.35 \times 0.07 = 0.0387$. The cumulative effect of a one standard deviation shock to liquidity on equity issuance is the sum of these effects, which is equal to 0.1367.

[4] The economic significance of the three significant return coefficients in Model (3) of Table 2 is computed in an analogous way to the economic significance of the liquidity coefficients as described in footnote 2.

relative to stock returns in explaining variation in equity issuance are not sensitive to the correlation between liquidity changes and returns.

The regressions shown so far are based on the number of initial public offerings (IPOs) and seasoned equity issuances (SEOs) combined. An obvious question is whether our inferences hold separately for IPOs and SEOs. Model (9) estimates Model (3) for IPOs. We find that lags one, two, and three of liquidity changes are positive and significant. The sum of the liquidity change coefficients is 0.15, which is smaller than for Model (3). In contrast, the sum of the coefficients for market returns is higher, at 0.29. The opposite takes place when we estimate Model (3) for SEOs. We show the estimates in Model (10). We find that the contemporaneous change in liquidity has a positive significant coefficient as do the three lagged changes. The sum of the liquidity coefficient is 0.26. In contrast, only the contemporaneous market return and the first lag are significant. The sum of the coefficients on market returns is 0.17. It follows from this that both IPO and SEO changes are significantly related to market liquidity changes. However, while for IPOs market returns appear to be more economically important than changes in liquidity, the opposite is the case for SEOs. We also observe that SEOs respond to liquidity changes and market returns at least somewhat more promptly than IPOs, which makes sense since SEOs can arguably be executed or adapted more rapidly than IPOs.

4. Is the relation between liquidity and equity issuance due to other factors?

The results in the previous section show that equity issuance is positively related to liquidity, even after controlling for market returns. It is well-known that liquidity is related to financial market conditions as well as to macroeconomic conditions (e.g. Chordia, Roll, and Subrahmanyam, 2001; Chordia, Sarkar, and Subrahmanyam, 2005; Næs, Skjeltorp, and Ødegaard, 2011) and that financial market conditions and macroeconomic conditions are related to equity issuance (e.g., Lowry, 2003). Hence, it could be the case that our liquidity variables proxy for other factors that affect equity issuance and are correlated with liquidity. In this section, we investigate whether the effects of liquidity can be explained by other financial and economic variables, including capital market conditions, (expected) economic activity, asymmetric information, and investor sentiment.

4.1. Market conditions, liquidity, and equity issuance

We turn first to regressions that add variables that proxy for market conditions to our benchmark regression. The results are shown in Table 3, where Model (1) is our benchmark regression (Model (3) of Table 2) reproduced to make comparisons easier.

In Model (2) of Table 3, we add lead, contemporaneous, and lagged changes in market volatility to our benchmark model that includes market liquidity and returns. Our measure of market volatility is the standard deviation of daily market returns during that quarter. We know that liquidity is negatively related to volatility (e.g., Chordia, Sarkar, and Subrahmanyam, 2005), and Schill (2004) shows that there are fewer equity issues in volatile times using U.S. data. It is thus possible that the effects of liquidity in Table 2 capture the role of market volatility. Surprisingly, none of the changes in market volatility have a significant coefficient in our global dataset. Adding changes in market volatility to the regression thus has no material impact on our inferences about the relation between equity issuance and market liquidity from Table 2.

Baker and Stein (2004) argue that market liquidity is a sentiment indicator and that periods of positive sentiment coincide with intense equity issuance. Using turnover as a liquidity proxy, they show that liquidity is positively correlated with aggregate time-variation in U.S. equity issuance.[5] Model (3) of Table 3 shows that the relation between liquidity and equity issuance in our global sample is not driven by turnover since adding turnover changes has no material impact on the

[5] Turnover can proxy for other stock characteristics besides liquidity. For instance, it can proxy for diversity of opinion. More generally, turnover does not seem to be widely accepted as a good proxy for time-series variation in liquidity. A common counterexample is that turnover tends to be high during financial crises, while liquidity tends to be low. Recent studies that evaluate liquidity proxies for U.S. and international equity markets (Goyenko, Holden, and Trzcinka, 2009; Fong, Holden, and Trzcinka, 2016) do not even include turnover as a proxy for liquidity. Lesmond (2005) studies the liquidity of emerging equity markets using different proxies (including turnover) and concludes: "These results cast doubt on a wide range of studies employing turnover as a principal liquidity proxy." (p. 423). In our sample, market turnover is only weakly correlated with changes in liquidity, at 0.06.

coefficient on market liquidity changes. It is interesting to note that controlling for market liquidity changes, turnover changes have negative coefficients. The lead, contemporaneous, and two of the lagged coefficients are significant.

Model (4) shows that the contemporaneous relation between liquidity and equity issuance survives controlling for a proxy for liquidity risk (conditional liquidity volatility based on a GARCH(1,1) model estimated by country). Adding liquidity risk changes has no material impact on our estimates of the coefficients on liquidity changes.

Although we control for potential market timing effects using lead, contemporaneous, and lagged market returns, many studies use the market-to-book ratio as a proxy for market timing (e.g., DeAngelo, DeAngelo, and Stulz, 2010). Since more liquid firms in the U.S. have a higher market-to-book ratio (Fang, Noe, and Tice, 2009), we want to make sure that liquidity is not picking up the effect of market-to-book. We use a measure of the aggregate market to book ratio, which is obtained by summing up the market capitalization of all individual stocks in a country and dividing by the sum of equity book values. Again, our inferences are not meaningfully affected by controlling for changes in the market-to-book ratio. The sum of the coefficients on market-to-book changes is of the same order of magnitude as the sum of the coefficients for market liquidity changes or for stock returns. (We note that coefficients can be directly compared across independent variables because they are standardized.) However, only one coefficient on market-to-book changes is statistically significant, the coefficient on the second lag of market-to-book changes. Another measure of valuation that may be relevant for market timing is the price-earnings ratio. Again, adding that variable has no material impact on our results, as can be seen in Model (6). Lastly, we use the dividend-yield ratio. Not surprisingly, a higher dividend-yield ratio is negatively related to equity issuance changes. The contemporaneous and lagged coefficients are significant. However, our inferences about the relation between equity issuance changes and liquidity changes are unaffected.

The last regression in Table 3, Model (8), uses all the variables introduced in Models (2) to (7). Obviously, these variables are correlated. It is noteworthy that adding all these variables to our benchmark model increases the adjusted R^2 by only 2% relative to Model (1). When we add all these variables, lags two and three of liquidity changes are positive and significant. The other coefficients do not change materially, but lag one is no longer significant. Most other coefficients are insignificant.

Though we do not reproduce the results in the table, we also estimate Model (3) of Table 2 adding proxies for the closed-end fund discount, which is used as a measure of sentiment (Lee, Shleifer, and Thaler, 1991). We construct the country closed-end fund discount variables in the same way as Karolyi, Lee, and van Dijk (2012). They construct time-series of local closed-end country fund discounts for 22 of the countries in our sample based on a sample of 42 closed-end funds. Unfortunately, because of the limited availability of the closed-end fund discounts, our sample drops in half. Lags one and two of changes in the closed-end fund discount have significantly positive coefficients. Adding these variables has no impact on our inferences.

4.2. Macroeconomic conditions, liquidity, and equity issuance

It is well-known that expectations about macroeconomic conditions are related to equity issuance as well as to liquidity. In Table 4, we investigate the relation between changes in equity issuance and changes in market liquidity when we control for changes in various proxies for macroeconomic conditions. Admittedly, some of the variables used in Table 4 could fit equally well in Table 3. As with Table 4, we reproduce our benchmark regression Model (3) of Table 2 in the first column of the Table to make comparisons easier.

Recent studies show that liquidity forecasts economic activity (e.g., Næs, Skjeltorp, and Ødegaard, 2011) and we know from the equity issuance literature that firms issue more equity in anticipation of better economic conditions. Following Lowry (2003), we proxy for expectations about economic conditions using GDP growth in Model (2) and sales growth in Model (3). Lowry introduces these variables as proxies for the demand for capital. None of the coefficients on GDP growth are significant. Adding the lead, contemporaneous, and four lags of GDP growth does not affect the coefficients on market liquidity materially and does not change our inferences. Surprisingly, not only are the coefficients not statistically significant, but they are economically extremely small as well. In Model (3), we reach the same conclusions when we add sales growth. In Model (4), we also include the composite leading economic indicator of the OECD (only available for OECD countries). The only significant coefficient is the coefficient for lag one. The coefficient is economically significant as it is 0.23. In other words, a one standard deviation higher leading economic indicator last quarter is followed by an increase in equity issuance of slightly more than one fifth of a standard deviation in this quarter. Adding the leading indicator has no material impact on the coefficients on changes in liquidity, but it appears to decrease the coefficients on stock market returns.

It is well-documented that the liquidity of a stock is inversely related to the degree of asymmetric information about the stock's value. More asymmetric information is also likely to lead to greater costs of raising equity capital, so changes in information asymmetries could influence liquidity and equity issuance simultaneously and in the same direction. As argued in the introduction, this identification issue is unlikely to be of great concern in our analysis of the relation between aggregate liquidity and aggregate equity issuance.[6] Nonetheless, it may be the case that market-wide fluctuations in information asymmetries affect aggregate liquidity and aggregate issuance at the same time and in a similar way. In Model (5) of Table 4, we include a proxy for market-wide variation in information asymmetries, namely a measure of aggregate idiosyncratic volatility. The idiosyncratic volatility proxy is computed as the value-weighted average of the residual volatility from market model regressions run for each individual stock within a country. We find again that our inferences from Table 2 are unaffected when we add changes in idiosyncratic volatility. The only coefficient that is significant for idiosyncratic volatility changes is the coefficient for lag two which is positive with a value of 0.06. In Model (6), we add "stock price

[6] Baker and Stein (2004, p. 272) state that it seems "a stretch to argue that there are large swings in the degree of asymmetric information about the market as a whole."

synchronicity" changes as an alternative proxy for information asymmetries. Stock price synchronicity is computed as the value-weighted average R^2 from market model regressions run for each individual stock within a country. Morck, Yeung, and Yu (2000) argue that greater stock price synchronicity is associated with less-informative stock prices. Our inferences are not affected by the inclusion of stock price synchronicity. While the lead stock price synchronicity change has a significantly positive coefficient, the first lag of stock price synchronicity change has a significantly negative coefficient.

In Model (7) of Table 4, we include all control variables from Models (2)-(7) simultaneously. Although we lose degrees of freedom due to a considerable reduction in the sample size because variables are missing for some country-quarters, if anything the effects of liquidity changes become slightly stronger.

Overall, the results in Tables 3 and 4 suggest that the positive relation between market liquidity and aggregate equity issuance is unlikely to be due to economic or financial variables that are unrelated to the aggregate demand elasticity of the stock market, but could simultaneously affect liquidity and equity issuance for other reasons.

5. The determinants of the relation between equity issuance and liquidity change

In this section, we investigate the determinants of the relation between equity issuance changes and liquidity changes by exploring how the relation differs across countries, firm types, time, and type of liquidity shocks. We also investigate whether there is a relation between changes in equity issuance proceeds (as opposed to counts) and liquidity changes.

We first investigate how the issuance/liquidity relation is affected by financial development. There are good reasons to think that the equity issuance decision is different in financially developed countries versus other countries. In financially more developed countries, we expect firms to be better able to issue equity rapidly and take advantages of changes in circumstances. In such countries, the stock market is more established and deeper. There is a vast literature that firms in less financially developed countries often find it advantageous to issue equity outside their country, taking advantage of better developed stock markets (e.g., Henderson, Jegadeesh, and Weisbach, 2006). Our measure of financial development is the average of the annual stock market capitalization to GDP over our sample period (obtained from the World Bank) and we define financially developed countries as the ones in the top half of the sample based on this measure.

We show the results in Table 5. As before, Model (1) just repeats the benchmark regression Model (3) of Table 2 for comparison. Model (2) estimates the benchmark model for financially developed countries. The market liquidity change variables have significant positive coefficients contemporaneously and at lags one, three, and four. The sum of the coefficients is roughly one third higher than in the benchmark model, at 0.46. The sum of the coefficients on the stock return variables is slightly larger as well than in the benchmark model, at 0.34. Hence, the economic importance of the coefficients on liquidity changes is again substantial, and considerably greater than that of the coefficients on stock returns. Turning to the less financially developed countries in Model (3), we see that the coefficients on liquidity changes are much smaller. Only one of the liquidity coefficients is significant, namely that for lag three. The sum of the coefficients on liquidity changes is 0.15, which is roughly half of that in the benchmark regression and less than a third compared to the regression for the more financially developed countries. The sum of the coefficients on stock returns is about the same as in the benchmark regression, so we find that for less financially developed countries, the relation between equity issuance changes and liquidity is of smaller economic importance than that of stock returns. In unreported tests, we estimate Models (2) and (3) of Table 5 with additional variables, including leading economic indicators, turnover, changes in the price-earnings ratio, and changes in idiosyncratic volatility, and our conclusions are unchanged.

Though we do not report the results in the table, we looked at how the coefficients on liquidity are related to other indicators of financial development and good institutions. In Table 5, the sum of the significant liquidity coefficients is 0.27 for developed countries and 0.07 for less developed countries. When we compare countries with below-median and above-median disclosure standards (Bushman, Piotroski, and Smith, 2004), the sum of the significant liquidity coefficients is 0.35 for the above-median countries and 0.14 for the below-median countries. Similar results hold when we compare quality of government (Morck, Yeung, and Yu, 2000), size of the mutual fund industry (Khorana, Servaes, and Tufano, 2003), and gross capital flows.

Firms may have to issue equity with different degrees of urgency. In particular, DeAngelo, DeAngelo, and Stulz (2010) show that many firms that issue equity would have a cash flow deficit without the equity issue. We expect that if a firm has to issue equity with a great degree of urgency, variation in liquidity will not have much impact on its decision. To investigate this hypothesis, we split issuers between issuers that have positive return on assets in the year of the issue (ROA, obtained from Datastream) versus issuers that have negative return on assets. Firms with negative ROA are unlikely to postpone issuing equity because the market has become less liquid as they may require new funds simply to stay afloat. Model (4) shows the regression estimates for the sub-sample of issuers with positive ROA. The coefficients on contemporaneous liquidity changes as well as the first three lags of liquidity changes are positive and significant. The sum of the coefficients on liquidity changes is 0.29. When we turn to the coefficients on market returns, the contemporaneous market return and the first two lags are significant. The sum of the coefficients is 0.22. It follows that for these firms there is a strong relation between equity issuance changes and liquidity changes. When we turn to firms with negative ROA in Model (5), none of the coefficients on market liquidity changes are significant and only one of the coefficients on market return is significant. None of the coefficients exceeds 0.04. Essentially, there is no relation between equity issuance changes and market liquidity changes for these firms.

We now consider how the relation between equity issuance changes and liquidity changes is affected by the nature of liquidity shocks. Throughout the paper, we estimated our regressions using quarter fixed effects. These effects effectively remove common effects across countries. We remove them to be conservative as these effects could be business cycle effects, for instance.

However, these effects could also be common liquidity shocks, so that by removing them we only have country-specific liquidity shocks. Model (6) estimates our benchmark regression without the quarter fixed effects. We see that the sum of the significant liquidity coefficients is now 0.31 instead of 0.22. Further, the contemporaneous coefficient is now significant. These results suggest that using quarter fixed effects attenuates the coefficients on liquidity. However, importantly, a conclusion to be drawn from the comparison of Model (6) to the benchmark model is that the country-specific liquidity shocks appear to be more important than the common liquidity shocks across countries. If we attribute the higher coefficients in Model (6) to common liquidity shocks, then more than 2/3rd of the impact of liquidity would be due to country-specific shocks. Obviously, attributing all of the increase in coefficients when excluding quarter fixed effects to common liquidity shocks may be overstating the impact of such common liquidity shocks.

Since we use quarter fixed effects, the impact of the financial crisis on our results is unclear. Suppose that the crisis creates a common liquidity shock that overwhelms local liquidity shocks. In this case, by using quarter fixed effects, we would largely eliminate the impact of liquidity shocks during the crisis. We examined how our results depend on the crisis by identifying a crisis period from 2008 to 2011. This period is chosen to include the credit crisis and the European sovereign debt crisis. If we estimate the benchmark regression excluding the crisis period and without quarter fixed effects, we find a much larger economic effect of liquidity as we have four significant coefficients and their sum is 0.41. These estimates are shown in Model (7). We estimate the same model for the crisis period (not reported) and only one liquidity coefficient is significant. It follows that changes in liquidity during the crisis period have a muted effect. This could be consistent with a situation where firms that issue during a crisis do so because they have little choice and hence their decision might not be dependent on liquidity.

We also investigate but do not tabulate whether the relation between equity issuance changes and liquidity changes depends on the size of the liquidity shock. When we split the liquidity shocks at the median, there is no material difference between the coefficients for the largest and smallest liquidity shocks.

Our last investigation in Table 5 looks at the relation between aggregate proceeds from equity issues and liquidity. In most countries, proceeds are noisy since an issue by a large firm can make a big difference in the total amount of proceeds. In contrast, whether a large firm issues instead of a small firm has no impact on the number of issues. Model (8) shows that in the non-crisis period there is a positive relation between changes in proceeds and changes in liquidity. The coefficients at lags one and three are statistically significant. When we include the crisis period, the coefficients (not tabulated) are positive but not significant. It follows from this that there is a relation between changes in liquidity and changes in proceeds, but only reliably so for the non-crisis period.

In Table 6, we investigate whether including the effects of changes in liquidity allows for better out-of-sample predictions of changes in equity issuance by performing one-step-ahead forecasting exercises. While relevant in itself, this exercise also shows whether the effects of liquidity found in previous analyses are stable as opposed to sample-specific. We iteratively estimate coefficients in-sample using a panel regression with country and quarter fixed effects, starting with the first 50% of the sample period, and we use the estimated coefficients to make an out-of-sample one-step-ahead forecast. After each iteration, we expand the in-sample window by one quarter.

Table 6 shows the mean-squared prediction errors (MSPEs) for two pairs of models. Model (1) is a benchmark model and contains the most basic forecast model available: next quarter's forecast equals the average change in equity issues over the estimation window. In Model (2), next quarter's change in equity issues is a function of the three significant lags of liquidity changes from Model (3) of Table 2. The MSPE is lower in Model (2) than in Model (1), both when the crisis period is included in the sample and when it is not. Diebold-Mariano (1995) tests show that these decreases are significant; using liquidity to predict next quarter's equity issues significantly improves forecasting performance over the naive forecast. Model (3) is again a benchmark and contains three lags of changes in the number of issues as well as contemporaneous market returns and two lags of market returns. Model (4) equals Model (3) with the addition of the three lags of changes in market liquidity. The MSPE of Model (4) is lower than the MSPE in Model (3), regardless of whether the crisis period is included. Diebold-Mariano tests show that the decrease in MSPE is significant, but only when the crisis period is excluded. Summing up, including changes in liquidity in the prediction model improves out-of-sample predictions of changes in equity issues, and often significantly so. Moreover, the effects of liquidity found in previous analyses are stable rather than sample-specific, although the liquidity changes are of less added value when the crisis period is included in the out-of-sample evaluation period.

6. Conclusions

In this paper, we show that equity issuance across the world is strongly related to equity market liquidity. Using changes in country level liquidity as an explanatory variable for changes in equity issuance, we find that variation in liquidity explains as much of the variation in equity issuance as contemporaneous and past market returns. We provide evidence that this relation between liquidity changes and equity issuance changes cannot be attributed to liquidity serving as a proxy for the general state of capital markets, aggregate economic activity, asymmetric information or market sentiment. It is also not plausible that the relation could be due to reverse-causation, since equity issuance represent a tiny fraction of existing stock outstanding at the country level. We show that issuance is more strongly related to liquidity in more financially developed markets, consistent with the view that firms are able to issue equity more rapidly in these countries. On the other hand, the relation between issuance and liquidity is weaker for loss making firms and during the 2008-2011 financial crisis, which suggests that in circumstances where issuing equity is a matter of greater urgency, liquidity considerations play a smaller role. Furthermore, we show that accounting for variation in liquidity not only improves explanatory power for issuance variation in-sample, but also enhances out-of-sample predictive power. We interpret our findings to be supportive of the view that asset market liquidity affects the cost of equity issuance and that firms take asset market liquidity into account when deciding whether and when to issue equity.

References

Acharya, V., and L. Pedersen, 2005, Asset pricing with liquidity risk, *Journal of Financial Economics* 77, 375-410.

Amihud, Y., 2002, Illiquidity and stock returns: Cross-section and time-series effects, *Journal of Financial Markets* 5, 31-56.

Amihud, Y., A. Hameed, W. Kang, and H. Zhang, 2015, The illiquidity premium: International evidence. *Journal of Financial Economics* 117, 350-368.

Amihud, Y., and H. Mendelson, 1986, Asset pricing and the bid-ask spread, *Journal of Financial Economics* 17, 223-249.

Avramov, D., T. Chordia, and A. Goyal, 2006, Liquidity and autocorrelations in individual stock returns, *Journal of Finance* 61, 2365-2394.

Bagwell, L.S., 1992, Dutch auction repurchases: An analysis of shareholder heterogeneity, *Journal of Finance* 47, 71-105.

Baker, M., and J.C. Stein, 2004, Market liquidity as a sentiment indicator, *Journal of Financial Markets* 7, 271–299.

Baker, M., and J. Wurgler, 2002, Market timing and capital structure, *Journal of Finance* 57, 1–32.

Bali, T.G., L. Peng, Y. Shen, and Y. Tang, 2014, Liquidity shocks and stock market reactions, *Review of Financial Studies* 27, 1434-1485.

Beber, A., and M. Pagano, 2013, Short-selling bans around the world: Evidence from the 2007-09 crisis, *Journal of Finance* 68, 343-381.

Brunnermeier, M.L., and L.H. Pedersen, 2009, Market liquidity and funding liquidity, *Review of Financial Studies* 22, 2201-2238.

Bushman, R.M., J.D. Piotroski, and A.J. Smith, 2004, What determines corporate transparency?, *Journal of Accounting Research* 42, 207-252.

Butler, A.W., G. Grullon, and J.P. Weston, 2005, Stock market liquidity and the cost of issuing equity, *Journal of Financial and Quantitative Analysis* 40, 331-348.

Choe, H., R.W. Masulis, and V.K. Nanda, 1993, Common stock offerings across the business cycle: Theory and evidence, *Journal of Empirical Finance* 1, 3-31.

Chordia, T., S.W. Huh, and A. Subrahmanyam, 2009, Theory-based illiquidity and asset pricing, *Review of Financial Studies* 22, 3629-3668.

Chordia, T., R. Roll, and A. Subrahmanyam, 2000, Commonality in liquidity, *Journal of Financial Economics* 56, 3-28.

Chordia, T., R. Roll, and A. Subrahmanyam, 2001, Market liquidity and trading activity, *Journal of Finance* 56, 501-530.

Chordia, T., A. Sarkar, and A. Subrahmanyam, 2005, An empirical analysis of stock and bond market liquidity, *Review of Financial Studies* 18, 85-129.

DeAngelo, H., L. DeAngelo, and R.M. Stulz, 2010, Seasoned equity offerings, market timing, and the corporate lifecycle, *Journal of Financial Economics* 95, 275-295.

Diebold, F.X., and R.S. Mariano, 1995, Comparing predictive accuracy, *Journal of Business and Economic Statistics* 13, 253-263.

Doidge, C., G.A. Karolyi, and R.M. Stulz, 2013, The U.S. left behind: The rise of IPO activity around the world, *Journal of Financial Economics* 110, 546-573.

Fang, V.W., T.H. Noe, and S. Tice, 2009, Stock market liquidity and firm value, *Journal of Financial Economics* 94, 150-169.

Ferreira, M.A., and P. Matos, 2008, The colors of investors' money: The role of institutional investors around the world, *Journal of Financial Economics* 88, 499-533.

Fong, K., C.W. Holden, and C.A. Trczinka, 2016, What are the best liquidity proxies for global research?, working paper.

Gao, X., and J.R. Ritter, 2010, The marketing of seasoned equity offerings, *Journal of Financial Economics* 97, 33-52.

Goyenko, R., C.W. Holden, and C. Trzcinka, 2009, Do liquidity measures measure liquidity?, *Journal of Financial Economics* 92, 153-181.

Griffin, J.M., F. Nadari, and R.M. Stulz, 2007. Do investors trade more when stocks have performed well? Evidence from 46 countries, *Review of Financial Studies* 20, 905-951.

Hasbrouck, J., 2009, Trading costs and returns for US equities: Estimating effective costs from daily data, *Journal of Finance* 64, 1445-1477.

Henderson, B.J., N. Jegadeesh, and M.S. Weisbach, 2006, World markets for raising new capital, *Journal of Financial Economics* 82, 63-101.

Hou, K., and M.A. van Dijk, 2016, Resurrecting the size effect: Firm size, profitability shocks, and expected stock returns, working paper.

Ince, O.S. and R.B. Porter, 2006, Individual equity return data from Thomson Datastream: Handle with care!, *Journal of Financial Research* 29, 463–479.

Kamara, A., X. Lou, and R. Sadka, 2008, The divergence of liquidity commonality in the cross-section of stocks, *Journal of Financial Economics* 89, 444-466.

Kandel, S., O. Sarig, and A. Wohl, 1999, The demand for stocks: An analysis of IPO auctions, *Review of Financial Studies* 12, 227-247.

Karolyi, G.A., K.-H. Lee, and M.A. van Dijk, 2012, Understanding commonality in liquidity around the world, *Journal of Financial Economics* 105, 82-112.

Kim, W., and M.S. Weisbach, 2008, Motivations for public equity offers: An international perspective, *Journal of Financial Economics* 87, 281-307.

Khorana, A., H. Servaes, and P. Tufano, 2005, Explaining the size of the mutual fund industry around the world, *Journal of Financial Economics 78*, 145-185.

Kyle, A.S., 1985, Continuous auctions and insider trading, *Econometrica* 53, 1315-1335.

Lee, C.M.C., A. Shleifer, and R.H. Thaler, 1991, Investor sentiment and the closed-end fund puzzle, *Journal of Finance* 46, 75-109.

Lesmond, D., 2005, Liquidity of emerging markets, *Journal of Financial Economics* 77, 411-452.

Lipson, M.L., and S. Mortal, 2009, Liquidity and capital structure, *Journal of Financial Markets* 12, 611-644.

Lo, A.W., and Wang, J., 2000, Trading volume: Definitions, data analysis and implications of portfolio theory, *Review of Financial Studies* 13, 257-300.

Loughran, T., and J.R. Ritter, 1995, The new issues puzzle, *Journal of Finance* 50, 23-51.

Loughran, T., and J.R. Ritter, 1997, The operating performance of firms conducting seasoned equity offerings, *Journal of Finance* 52, 1823-1850.

Lowry, M., 2003, Why does IPO volume fluctuate so much?, *Journal of Financial Economics* 67, 3-40.

McLean, R.D., T. Zhang, and M. Zhao, 2011, Investor protection and choice of share issuance mechanism, working paper.

Miller, M.H., 1963, The corporate income tax and corporate financial policies, Cowles Foundation Paper 210b.

Morck, R., B. Yeung, and W. Yu, 2000, The information content of stock markets: Why do emerging markets have synchronous stock price movements?, *Journal of Financial Economics* 58, 215-260.

Næs, R., J.A. Skjeltorp, and B.A. Ødegaard, 2011, Stock market liquidity and the business cycle, *Journal of Finance* 66, 139-176.

Schill, M.J., 2004, Sailing in rough water: Market volatility and corporate finance, *Journal of Corporate Finance* 10, 659-681.

Shleifer, A., 1986, Do demand curves for stock slope down?, *Journal of Finance* 41, 579-590.

Spiegel, M., and X. Wang, 2005, Cross-sectional variation in stock returns: Liquidity and idiosyncratic risk, working paper.

Watanabe, A., and M. Watanabe, 2008, Time-varying liquidity risk and the cross-section of stock returns, *Review of Financial Studies* 21, 2449-2486.

Appendix: Variable definitions and data sources

Variable	Description	Source
Dependent variables		
number of issues	The quarterly number of primary common share issues (Initial Public Offerings (IPOs) and Seasoned Equity Offerings (SEOs)). Aggregation by quarter is based on the issue date. We exclude issues by utility companies and financial firms (two-digit SIC codes 49 and 60), foreign issues, and issues that were eventually postponed or cancelled. We include only stocks on the main exchanges. For the U.S., we include issues from both Nasdaq- and NYSE-listed companies, but treat them as separate countries.	Securities Data Company (SDC)
number of IPOs	The quarterly number of primary common share issues (IPOs only). Aggregation by quarter is based on the issue date. We exclude issues by utility companies and financial firms (two-digit SIC codes 49 and 60), foreign issues, and issues that were eventually postponed or cancelled. For the U.S., we include issues from both Nasdaq- and NYSE-listed companies, but treat them as separate countries.	Securities Data Company (SDC)
number of SEOs	The quarterly number of primary common share issues (SEOs only). Aggregation by quarter is based on the issue date. We exclude issues by utility companies and financial firms (two-digit SIC codes 49 and 60), foreign issues, and issues that were eventually postponed or cancelled. For the U.S., we include issues from both Nasdaq- and NYSE-listed companies, but treat them as separate countries.	Securities Data Company (SDC)
number of issues: ROA>0	The quarterly number of primary common share issues (IPOs and SEOs) of firms that had a positive ROA in the year before the offering. Aggregation by quarter is based on the issue date. We exclude issues by utility companies and financial firms (two-digit SIC codes 49 and 60), foreign issues, and issues that were eventually postponed or cancelled. For the U.S., we include issues from both Nasdaq- and NYSE-listed companies, but treat them as separate countries.	Own computations; Securities Data Company (SDC)
number of issues: ROA<0	The quarterly number of primary common share issues (IPOs and SEOs) of firms that had a negative ROA in the year before the offering. Aggregation by quarter is based on the issue date. We exclude issues by utility companies and financial firms (two-digit SIC codes 49 and 60), foreign issues, and issues that were eventually postponed or cancelled. For the U.S., we include issues from both Nasdaq- and NYSE-listed companies, but treat them as separate countries.	Own computations; Securities Data Company (SDC)
gross proceeds	The quarterly proceeds of issues (IPOs and SEOs). Aggregation by quarter is based on the issue date. We exclude issues by utility companies and financial firms (two-digit SIC codes 49 and 60), foreign issues, and issues that were eventually postponed or cancelled. We include only stocks on the main exchanges. For the U.S., we include issues from both Nasdaq- and NYSE-listed companies, but treat them as separate countries.	Securities Data Company (SDC)

Appendix, continued

Variable	Description	Source
Independent variables		
market returns	The quarterly average of monthly local currency stock level returns aggregated to the country level using value weighting.	Own computations; CRSP, Datastream
market liquidity	The quarterly average of monthly stock level liquidity aggregated to the country level using value weighting. The monthly stock level liquidity is calculated as the average daily liquidity within the month. Liquidity is calculated as Amihud's (2002) price impact proxy for individual stocks – computed as the absolute stock return divided by local currency trading volume. The Amihud measure is multiplied by -10,000 to obtain a measure that is increasing in liquidity.	Own computations; CRSP, Datastream
market volatility	The standard deviation of daily market returns within a quarter.	Own computations; CRSP, Datastream
market turnover	The quarterly average of monthly market level turnover. Daily stock level turnover is calculated as the deviation in the ratio of trading volume and the number of shares outstanding from its long-term moving average. Monthly market level turnover is calculated as the value weighted average of the average monthly stock level turnover.	Own computations; CRSP, Datastream
market liquidity risk	The conditional volatility of quarterly market-wide Amihud liquidity based on a GARCH(1,1) model estimated by country.	Own computations; Datastream
market-to-book ratio	The aggregate market value of equity, scaled by the aggregate book value of equity of listed common stock within in a country.	Own computations; Datastream
price-earnings ratio	The aggregate market value of equity, scaled by the aggregate earnings of equity of listed common stock within in a country.	Own computations; Datastream
dividend-yield	Aggregate dividends, scaled by the aggregate market value of equity of all listed common stock within a country.	Own computations; Datastream
GDP growth	Year-on-year % change of quarterly GDP (real, seasonally adjusted) by country.	IMF, World Bank
sales growth	Year-on-year % change of quarterly aggregate sales by country.	IMF, World Bank
LEI growth	Amplitude-adjusted composite leading economic indicator by country.	OECD Statistics
idiosyncratic volatility	The value-weighted average across all stocks within a country of the standard deviation of the residuals obtained from a simple market model run based on daily data within the quarter.	Own computations; Datastream
stock price synchronicity	The logistic transformation of the value-weighted average R^2 across all stocks within a country from a simple market model run based on daily data within the quarter.	Own computations; Datastream

Table 1: Summary statistics

This table reports the total number of equity issues (IPOs and SEOs from SDC), the number of IPOs, the number of SEOs, the time-series average and standard deviation (based on quarterly data) of local stock market returns (expressed in % per day), the standard deviation of local market liquidity scaled by the absolute value of the time-series average , and the time-series average of local market volatility for each of the 39 markets (38 countries; Nasdaq and NYSE are included separately) in our sample. The sample covers the period 1995Q1-2014Q4 (with the exception of Brazil and Germany, for which the data start in 2000Q1; Egypt, for which the data start at 1996Q4, and Russia, for which the data start in 2000Q1). Market returns are value-weighted average returns of common stocks from CRSP for the U.S., and from Datastream for the other countries. Market liquidity is the value-weighted average of the daily estimates of Amihud's (2002) price impact proxy for individual stocks – computed as the absolute stock return divided by local currency trading volume (and multiplied by -10,000 to obtain a measure that is increasing in liquidity). Market volatility is the standard deviation of daily market returns within a quarter. The table also depicts the total number of equity issues and the average of the other variables for developed countries and for emerging countries, as well as the grand total / average for developed and emerging countries jointly.

	# equity issues	**# IPOs**	**#SEOs**	***market returns***		***market liquidity***	***market volatility***
				mean	st.dev.	st.dev. /|mean|	mean
Developed countries							
Australia	19,144	1,694	17,450	0.061	0.114	0.537	0.018
Austria	120	40	80	0.053	0.190	0.425	0.011
Belgium	213	88	125	0.050	0.180	0.680	0.011
Canada	5,895	1,798	4,097	0.072	0.123	0.357	0.009
Denmark	273	76	197	0.068	0.165	0.891	0.020
Finland	204	65	139	0.077	0.212	0.481	0.013
France	1,365	517	848	0.062	0.159	0.425	0.011
Germany	1,285	448	837	0.033	0.176	0.386	0.012
Hong Kong	3,545	734	2,811	0.071	0.203	0.773	0.014
Israel	135	24	111	0.073	0.176	0.564	0.011
Italy	356	156	200	0.057	0.179	1.890	0.014
Japan	5,380	2,129	3,251	0.039	0.161	0.516	0.012
Netherlands	225	46	179	0.060	0.187	0.856	0.013
New Zealand	308	67	241	0.051	0.111	0.382	0.008
Norway	566	138	428	0.073	0.176	0.844	0.012
Singapore	1,611	488	1,123	0.052	0.177	0.709	0.011
Spain	240	54	186	0.052	0.161	0.621	0.012
Sweden	947	113	834	0.073	0.165	0.698	0.013
Switzerland	224	65	159	0.052	0.136	0.491	0.010
United Kingdom	7,838	1,577	6,261	0.057	0.114	0.639	0.010
U.S.: Nasdaq	7,491	3,017	4,474	0.096	0.185	0.621	0.014
U.S.: NYSE	4,374	1,166	3,208	0.065	0.113	0.523	0.010
Total/average	61,739	14,500	47,239	0.061	0.162	0.650	0.012

Table 1, continued

	# equity issues	# IPOs	#SEOs	market returns		market liquidity	market volatility
				mean	st.dev.	st.dev. /|mean|	mean
Emerging countries							
Brazil	436	119	317	0.126	0.200	2.368	0.014
Chile	269	27	242	0.060	0.153	1.304	0.008
China	3,158	1,952	1,206	0.066	0.273	0.610	0.016
Colombia	89	6	83	0.104	0.294	0.631	0.012
Egypt	249	27	222	0.071	0.270	0.952	0.014
Greece	231	128	103	0.035	0.307	0.991	0.018
India	4,591	2,777	1,814	0.090	0.235	0.588	0.014
Indonesia	525	270	255	0.138	0.297	1.927	0.016
Malaysia	1,697	656	1,041	0.053	0.216	0.811	0.010
Mexico	103	27	76	0.088	0.152	0.929	0.012
Philippines	340	91	249	0.075	0.206	1.169	0.012
Poland	488	253	235	0.072	0.218	1.039	0.014
Portugal	70	8	62	0.038	0.200	0.700	0.011
Russia	292	26	266	0.082	0.300	1.707	0.020
South Africa	208	36	172	0.082	0.136	0.548	0.010
South Korea	5,559	997	4,562	0.070	0.268	0.504	0.016
Thailand	977	343	634	0.064	0.252	0.880	0.014
Total/average	19,282	7,743	11,539	0.077	0.234	1.039	0.014
Developed and emerging countries							
Grand total/average	81,021	22,243	58,778	0.068	0.193	0.820	0.013

Table 2: Panel regressions of changes in equity issuance on changes in market liquidity and market returns

This table reports coefficient estimates of panel regressions with changes in the number of issues (common stock IPOs and SEOs from SDC) in each of the 39 markets (38 countries) in our sample over the period 1995Q1-2014Q4 as dependent variable – with the exception of Models (9) and (10), which have IPOs and SEOs separately as dependent variable. Independent variables include lead, contemporaneous, and lagged changes in local market liquidity, local market returns, and lagged dependent variables. Variable definitions are in the Appendix. All variables are demeaned and standardized by country, so any coefficient can be interpreted as the effect in standard deviations on the dependent variable of a one standard deviation shock to the independent variable corresponding to that coefficient. Standard errors are clustered by country and quarter. Significance at the 1%, 5% and 10% level is indicated by ***, **, and *.

Dependent variable:	***Δ number of issues (t)***									
Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9): IPOs	(10): SEOs
Δ market liquidity (t+2)				-0.03						
Δ market liquidity (t+1)	0.02	0.01	0.00	-0.01			-0.02		0.00	-0.01
Δ market liquidity (t)	0.06**	0.07**	0.04	0.04	0.04		0.04		-0.01	0.04*
Δ market liquidity (t-1)	0.06**	0.08***	0.07**	0.07**	0.06**		0.08**		0.06**	0.06*
Δ market liquidity (t-2)	0.03	0.05*	0.07**	0.07**	0.06*		0.07***		0.07**	0.05**
Δ market liquidity (t-3)	0.05*	0.06***	0.08***	0.08***	0.07***		0.09***		0.04*	0.07**
Δ market liquidity (t-4)	0.00	0.02	0.04	0.05			0.04		-0.01	0.05
Δ market liquidity (t-5)				0.04						
Δ market liquidity (t-6)				-0.01						
Δ market liquidity (t-4:t-1)						0.24***				
market returns (t+1)	-0.04	-0.01	0.00	0.00				-0.01	-0.01	0.01
market returns (t)	0.08***	0.06**	0.08***	0.08***	0.08***			0.08***	0.04	0.08***
market returns (t-1)	0.05	0.08***	0.09***	0.09***	0.09***			0.10***	0.11***	0.05*
market returns (t-2)	0.01	0.03	0.05**	0.05**	0.05**			0.05***	0.03	0.03
market returns (t-3)	-0.01	0.00	0.03	0.03**	0.03			0.03	0.04*	0.01
market returns (t-4)	0.02	0.02	0.04	0.04				0.03	0.08**	-0.01
market returns (t-4:t-1)						0.25***				
Δ number of issues (t-1)		-0.45***	-0.60***	-0.59***	-0.59***	-0.59***	-0.59***	-0.59***	-0.65***	-0.59***
Δ number of issues (t-2)			-0.35***	-0.35***	-0.35***	-0.35***	-0.34***	-0.35***	-0.38***	-0.36***
Δ number of issues (t-3)			-0.26***	-0.26***	-0.25***	-0.26***	-0.25***	-0.26***	-0.20***	-0.25***
Quarter fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Country fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
# observations	2,962	2,961	2,958	2,906	2,999	3,020	2,958	2,979	2,782	2,943
# markets	39	39	39	39	39	39	39	39	39	39
R^2 (%)	0.9	20.7	29.2	29.0	28.9	28.7	28.1	28.8	31.1	27.8

Table 3: Panel regressions of changes in equity issuance on changes in market liquidity: Controlling for market conditions

This table reports coefficient estimates of panel regressions with changes in the number of issues (common stock IPOs and SEOs from SDC) in each of the 39 markets (38 countries) in our sample over the period 1995Q1-2014Q4 as dependent variable. Independent variables include lead, contemporaneous, and lagged changes in local market liquidity, local market returns, changes in local market volatility, changes in local market turnover, changes in local market liquidity risk, changes in local market-to-book ratio, changes in local price-earnings ratio, changes in local dividend-price ratio, changes in local dividend yield, and lagged dependent variables. Variable definitions are in the Appendix. In Model (1) of this table, we reproduce the benchmark regression Model (3) of Table 2. All variables are demeaned and standardized by country, so any coefficient can be interpreted as the effect in standard deviations on the dependent variable of a one standard deviation shock to the independent variable corresponding to that coefficient. Standard errors are clustered by country and quarter. Significance at the 1%, 5% and 10% level is indicated by ***, **, and *.

Table 3, continued

Dependent variable:	*Δ number of issues (t)*							
Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Δ market liquidity (t+1)	0.00	0.00	0.00	-0.01	0.00	0.00	0.00	0.01
Δ market liquidity (t)	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Δ market liquidity (t-1)	0.07**	0.07**	0.07**	0.08**	0.07**	0.07*	0.07*	0.06
Δ market liquidity (t-2)	0.07**	0.07**	0.07**	0.07**	0.07**	0.07**	0.07**	0.05*
Δ market liquidity (t-3)	0.08***	0.09***	0.08***	0.08***	0.07***	0.07***	0.07***	0.07***
Δ market liquidity (t-4)	0.04	0.04	0.03	0.04	0.03	0.03	0.03	0.04
market returns (t+1)	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.02
market returns (t)	0.08***	0.08***	0.08***	0.08***	0.08***	0.07***	0.07**	0.06*
market returns (t-1)	0.09***	0.09***	0.08***	0.09***	0.09***	0.07***	0.07***	0.06*
market returns (t-2)	0.05**	0.05**	0.05**	0.05**	0.03	0.05**	0.03	0.02
market returns (t-3)	0.03	0.03*	0.03	0.04*	0.00	0.02	0.03	0.00
market returns (t-4)	0.04	0.04	0.03	0.04	0.04	0.04	0.04	0.04
Δ market volatility (t+1)		0.03						0.05
Δ market volatility (t)		-0.02						-0.01
Δ market volatility (t-1)		-0.01						-0.04
Δ market volatility (t-2)		0.01						-0.02
Δ market volatility (t-3)		0.02						-0.01
Δ market volatility (t-4)		0.03						0.01
Δ market turnover (t+1)			-0.04**					-0.05***
Δ market turnover (t)			-0.09***					-0.08***
Δ market turnover (t-1)			-0.05*					-0.04
Δ market turnover (t-2)			-0.05					-0.03
Δ market turnover (t-3)			-0.04*					-0.02
Δ market turnover (t-4)			-0.01					0.00
Δ market liquidity risk (t+1)				0.04				0.03
Δ market liquidity risk (t)				0.00				0.00
Δ market liquidity risk (t-1)				-0.01				-0.01
Δ market liquidity risk (t-2)				0.02				0.03
Δ market liquidity risk (t-3)				0.01				0.01
Δ market liquidity risk (t-4)				0.02				0.01
Δ market-to-book ratio (t+1)					0.02			0.00
Δ market-to-book ratio (t)					0.03			-0.03
Δ market-to-book ratio (t-1)					0.10			0.07
Δ market-to-book ratio (t-2)					0.12*			0.11
Δ market-to-book ratio (t-3)					0.01			-0.02
Δ market-to-book ratio (t-4)					0.00			-0.01
Δ price-earnings ratio (t+1)						0.04		0.04
Δ price-earnings ratio (t)						0.08***		0.06**
Δ price-earnings ratio (t-1)						0.03		0.01
Δ price-earnings ratio (t-2)						0.06**		0.04
Δ price-earnings ratio (t-3)						0.02		0.01
Δ price-earnings ratio (t-4)						0.03		0.02
Δ dividend-yield (t+1)							-0.04	-0.02
Δ dividend-yield (t)							-0.08**	-0.05
Δ dividend-yield (t-1)							-0.10**	-0.09**
Δ dividend-yield (t-2)							-0.01	0.01
Δ dividend-yield (t-3)							-0.01	-0.02
Δ dividend-yield (t-4)							-0.03	-0.04
Δ number of issues (t-1)	-0.60***	-0.59***	-0.60***	-0.60***	-0.61***	-0.61***	-0.61***	-0.61***
Δ number of issues (t-2)	-0.35***	-0.35***	-0.36***	-0.35***	-0.36***	-0.36***	-0.36***	-0.36***
Δ number of issues (t-3)	-0.26***	-0.26***	-0.26***	-0.26***	-0.27***	-0.27***	-0.27***	-0.27***
Quarter fixed effects	yes	yes	yes	yes	yes	yes	yes	yes
Country fixed effects	yes	yes	yes	yes	yes	yes	yes	yes
# observations	2,958	2,958	2,958	2,952	2,798	2,800	2,800	2,793
# markets	39	39	39	39	37	37	37	37
R^2 (%)	29.2	29.4	29.8	29.4	30.2	30.2	30.2	31.3

Table 4: Panel regressions of changes in equity issuance on changes in market liquidity: Controlling for macro conditions

This table reports coefficient estimates of panel regressions with changes in the number of issues (common stock IPOs and SEOs from SDC) in each of the 39 markets (38 countries) in our sample over the period 1995Q1-2014Q4 as dependent variable. Independent variables include lead, contemporaneous, and lagged changes in local market liquidity, local market returns, business cycle proxies (GDP growth, sales growth, and leading economic indicator growth), asymmetric information (changes in local stock price synchronicity, changes in idiosyncratic volatility), and lagged dependent variables. Variable definitions are in the Appendix. In Model (1) of this table, we reproduce the benchmark regression Model (3) of Table 2. All variables are demeaned and standardized by country, so any coefficient can be interpreted as the effect in standard deviations on the dependent variable of a one standard deviation shock to the independent variable corresponding to that coefficient. Standard errors are clustered by country and quarter. Significance at the 1%, 5% and 10% level is indicated by ***, **, and *.

Table 4, continued

Dependent variable:	*Δ number of issues (t)*						
Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Δ market liquidity (t+1)	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Δ market liquidity (t)	0.04	0.05**	0.05**	0.04**	0.04	0.04	0.04*
Δ market liquidity (t-1)	0.07**	0.07**	0.06**	0.07***	0.07**	0.07*	0.06**
Δ market liquidity (t-2)	0.07**	0.08**	0.08**	0.09***	0.07***	0.07**	0.08**
Δ market liquidity (t-3)	0.08***	0.07**	0.08***	0.07***	0.09***	0.08***	0.09**
Δ market liquidity (t-4)	0.04	0.03	0.02	0.03	0.04	0.04	0.04
market returns (t+1)	0.00	-0.01	-0.01	-0.01	-0.01	0.00	-0.02
market returns (t)	0.08***	0.07**	0.08**	0.06**	0.08***	0.07***	0.06*
market returns (t-1)	0.09***	0.07**	0.07**	0.05*	0.09***	0.08***	0.04
market returns (t-2)	0.05**	0.06*	0.06*	0.05	0.05**	0.05**	0.07*
market returns (t-3)	0.03	0.03	0.03	0.03	0.04	0.03	0.05*
market returns (t-4)	0.04	0.03	0.03	0.04	0.03	0.04	0.04
GDP growth (t+1)		0.00					-0.02
GDP growth (t)		-0.01					0.00
GDP growth (t-1)		0.03					0.06*
GDP growth (t-2)		-0.03					-0.03
GDP growth (t-3)		0.00					-0.04*
GDP growth (t-4)		0.01					0.04**
sales growth (t+1)			-0.01				-0.01
sales growth (t)			0.01				0.01
sales growth (t-1)			0.00				0.00
sales growth (t-2)			-0.01				-0.01
sales growth (t-3)			0.00				0.00
sales growth (t-4)			0.01				0.00
LEI growth (t+1)				0.06			0.09*
LEI growth (t)				-0.13			-0.21**
LEI growth (t-1)				0.23*			0.32***
LEI growth (t-2)				-0.22			-0.28***
LEI growth (t-3)				0.11			0.14
LEI growth (t-4)				-0.02			-0.02
Δ idiosyncratic volatility (t+1)					0.02		-0.01
Δ idiosyncratic volatility (t)					-0.04		-0.14***
Δ idiosyncratic volatility (t-1)					0.03		0.00
Δ idiosyncratic volatility (t-2)					0.06**		0.02
Δ idiosyncratic volatility (t-3)					0.01		0.00
Δ idiosyncratic volatility (t-4)					0.03		0.07
Δ stock price synchronicity (t+1)						0.05*	0.07**
Δ stock price synchronicity (t)						-0.01	-0.02
Δ stock price synchronicity (t-1)						-0.06***	-0.07***
Δ stock price synchronicity (t-2)						-0.04	-0.02
Δ stock price synchronicity (t-3)						-0.01	0.03
Δ stock price synchronicity (t-4)						0.01	0.05
Δ number of issues (t-1)	-0.60***	-0.61***	-0.62***	-0.60***	-0.59***	-0.59***	-0.61***
Δ number of issues (t-2)	-0.35***	-0.36***	-0.37***	-0.36***	-0.35***	-0.35***	-0.36***
Δ number of issues (t-3)	-0.26***	-0.27***	-0.27***	-0.27***	-0.27***	-0.26***	-0.26***
Quarter fixed effects	yes	yes	yes	yes	yes	yes	yes
Country fixed effects	yes	yes	yes	yes	yes	yes	yes
# observations	2,958	2,371	2,193	2,421	2,942	2,942	2,129
# markets	39	33	30	32	39	39	29
R^2 (%)	29.2	30.3	30.6	30.2	29.5	29.6	32.2

Table 5: The determinants of the relation between changes in equity issuance and changes in liquidity

This table reports coefficient estimates of panel regressions with changes in the number of issues (Models (1 through (7)) or changes in the proceeds from issues (Model (8)) as dependent variables (common stock IPOs and SEOs from SDC) for different subsamples. The full sample covers the period 1995Q1-2014Q4. Independent variables include lead, contemporaneous, and lagged changes in local market liquidity, local market returns, and lagged dependent variables. All variable definitions are in the Appendix. In Model (1) of this table, we reproduce the benchmark regression Model (3) of Table 2. For the financial development regressions the countries are split into financially developed (Model (2)) and financially emerging (Model (3)) based on their average stock market capitalization to GDP over the sample period. For Models (4) and (5), the sample of issues is split into those by firms with postive and negative return on assets in the year of the issue (ROA, obtained from Datastream). Model (6) is the same as Model (1) but excludes country fixed effects. For Models (7) and (8), we exclude the crisis period, which is defined as 2008Q1-2011:Q4. All variables are demeaned and standardized by country, so any coefficient can be interpreted as the effect in standard deviations on the dependent variable of a one standard deviation shock to the independent variable corresponding to that coefficient. Standard errors are clustered by country and quarter. Significance at the 1%, 5% and 10% level is indicated by ***, **, and *.

Dependent variable:	***Δ number of issues (t)***							***Δ proceeds (t)***
Model:	(1): Full sample	(2): Fin. devel.	(3): Fin. emer.	(4):ROA>0	(5):ROA<0	(6): Full sample	(7): w/o crisis	(8): w/o crisis
Δ market liquidity (t+1)	0.00	0.04	-0.03	-0.01	-0.03	-0.01	-0.01	-0.02
Δ market liquidity (t)	0.04	0.07*	0.00	0.06*	0.00	0.06*	0.08**	0.01
Δ market liquidity (t-1)	0.07**	0.10***	0.04	0.09**	0.03	0.08*	0.11***	0.07**
Δ market liquidity (t-2)	0.07**	0.04	0.08	0.07***	-0.01	0.08***	0.08**	0.05
Δ market liquidity (t-3)	0.08***	0.10***	0.07*	0.07***	0.03	0.09***	0.14***	0.06**
Δ market liquidity (t-4)	0.04	0.11*	-0.01	0.01	0.04	0.01	0.00	0.00
market returns (t+1)	0.00	0.01	-0.01	-0.02	0.04	-0.01	-0.04*	0.06**
market returns (t)	0.08***	0.09**	0.07***	0.08***	0.04**	0.10***	0.07***	0.07**
market returns (t-1)	0.09***	0.10**	0.09***	0.07**	0.02	0.14***	0.13***	0.10***
market returns (t-2)	0.05**	0.05*	0.05	0.05*	-0.01	0.03	0.08***	0.05*
market returns (t-3)	0.03	0.04*	0.04	0.00	-0.02	0.00	0.04*	0.03
market returns (t-4)	0.04	0.05	0.03*	0.04	-0.01	0.00	0.04	0.06**
Δ number of issues (t-1)	-0.60***	-0.55***	-0.65***	-0.65***	-0.69***	-0.63***	-0.63***	-0.71***
Δ number of issues (t-2)	-0.35***	-0.29***	-0.41***	-0.40***	-0.41***	-0.33***	-0.36***	-0.47***
Δ number of issues (t-3)	-0.26***	-0.24***	-0.29***	-0.24***	-0.21***	-0.30***	-0.29***	-0.27***
Quarter fixed effects	yes	yes	yes	yes	yes	no	no	yes
Country fixed effects	yes	yes	yes	yes	yes	yes	yes	yes
# observations	2,958	1,575	1,383	2,964	2,964	2,958	2,334	2,334
# markets	39	20	19	39	39	39	39	39
R^2 (%)	29.2	26.7	33,2	31.4	32.7	35.2	34.3	34.8

Table 6: Out-of-sample prediction of changes in equity issuance with changes in liquidity

This table reports mean-squared prediction errors (MSPEs) of out-of-sample forecasts of changes in the number of issues (common stock IPOs and SEOs from SDC) in each of the 39 markets (38 countries) in our sample over the period 1995Q1-2014Q4. Iteratively, coefficients are estimated in-sample using a panel regression with country and quarter fixed effects, and are used to make an out-of-sample one-step ahead forecast. After each iteration the in-sample window is expanded by one observation. Initially, the in-sample window includes the first 50% of the sample period. Independent variables include lagged changes in local market liquidity, contemporaneous and lagged local market returns, and lagged dependent variables. The crisis period is 2008Q1-2011:Q4. Variable definitions are in the Appendix. All variables are demeaned and standardized by country. The columns labelled ”DM-test” indicate whether the model is significantly different from the model indicated by the number between brackets, based on Diebold-Mariano (1995) tests. Significance at the 1%, 5% and 10% level is indicated by ***, **, and *.

Dependent Variable:	***Δ number of issues***				
Model	Independent Variables	With crisis		Without crisis	
		MSPE	DM-test	MSPE	DM-test
(1)	*Δ number of issues (t)*	1.0948		0.8317	
(2)	*Δ market liquidity (i,t-1:t-3)*	1.0768	(1):***	0.8126	(1):***
(3)	*Δ number of issues (t-1:t-3) + market returns (t:t-2)*	0.6967		0.5060	
(4)	*Δ number of issues (t-1:t-3) + market returns (t:t-2) + Δ market liquidity (t-1:t-3)*	0.6936	(3):-	0.5003	(3):***